Ultra-Long Monetary Anchoring

A terminal yield-curve regime for investment and stabilization: dual and pure versions, a 3-5% band at 50 years, a moving anti-deflation frontier, and an emergency extension to 100 years

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Version note
Research document in progress. Version 0.9 retains the quantitative normal-regime architecture of the previous version and extends it with two institutional formulations: a dual version, compatible with conventional short-rate control, and a pure version, which abandons price targets below the terminal horizon. It also adds a moving control frontier under deflation and an extraordinary terminal-anchor regime extending to 100 years with a 10% ceiling. The parameters are normative and require empirical testing.

Summary

This paper proposes a family of monetary regimes that reverses the conventional temporal hierarchy of monetary policy and turns the ultra-long end of the sovereign yield curve into an institutional anchor. Under the normal regime, the constant-maturity 50-year sovereign yield is centered on a 4% target, within a 3-5% band, with a hard 5% ceiling defended through demand-driven purchases. The proposal admits two versions. The dual version (AMUL-D) preserves a conventional short-rate instrument while adding the ultra-long anchor. The pure or strong version (AMUL-P), defended as the central thesis, abandons yield targets at all maturities below the terminal horizon: short and medium rates and the exchange rate absorb the adjustment endogenously, while the central bank guarantees only payment-system functioning and the terminal price. Net monetization remains contingent on the inflation regime: strong below 2%, normal between 2% and 3%, and selective between 3% and 5% provided expectations and exchange-rate dynamics remain anchored. If deflation persists after the 50-year yield reaches the 3% lower boundary, control may propagate backward toward progressively shorter maturities through a moving duration frontier. For extreme inflation, the paper formulates a two-dimensional emergency extension: the horizon may shift to 100 years and the ceiling may temporarily widen to 10%, exclusively as a terminal anchor, with sterilization of the liquidity effect of purchases whenever feasible. A Terminal Anchoring Margin (MAT) is introduced to compare the cumulative nominal return of the anchor asset with the expected cumulative price-level path, and a synthetic ultra-long zero-coupon yield is proposed to maximize the anchor's sensitivity to expectations. The paper develops the hypothesis of retrograde convergence of expectations: a nominal certainty imposed at the far end of the curve may, when supported by fiscal and monetary consistency, progressively organize freely determined shorter-maturity prices and the foreign-exchange market. The mechanism is related to Keynes, preferred habitat, Tobin, Wicksell, Fisher, New Keynesian/Taylor, Mundell-Fleming-Dornbusch, Cagan, Sargent-Wallace, the Fiscal Theory of the Price Level, functional finance, and Austrian and financial-repression critiques. The proposal does not claim that a terminal peg mechanically eliminates hyperinflation; it formulates conditions under which it may constitute a new class of long-horizon nominal anchor.

Abstract

This paper proposes a family of monetary regimes that reverses the conventional temporal hierarchy of monetary policy by turning the ultra-long end of the sovereign yield curve into an institutional anchor. Under the normal regime, the constant-maturity 50-year sovereign yield is centered on 4%, allowed to fluctuate within a 3-5% band, and subject to a hard 5% ceiling backed by demand-driven purchases. Two institutional versions are distinguished. The dual version (AMUL-D) preserves a conventional short-rate instrument while adding the ultra-long anchor. The pure or strong version (AMUL-P), advanced as the central thesis, abandons yield targets at all maturities below the terminal horizon: short and medium rates and the exchange rate become endogenous adjustment margins, while the central bank only guarantees payment-system liquidity and the terminal price. Net monetary accommodation remains state-contingent: strong below 2% inflation, normal between 2% and 3%, and selective between 3% and 5% as long as expectations and exchange-rate dynamics remain anchored. If deflation persists after the 50-year yield reaches the 3% lower boundary, control can propagate backward through progressively shorter maturities via a moving duration frontier. For extreme inflation, the paper develops a two-dimensional emergency terminal anchor: the horizon may be extended to 100 years and the ceiling temporarily widened to 10%, solely to control the terminal nominal yield, with sterilization of the liquidity impact of purchases whenever feasible. A Terminal Anchoring Margin (MAT) compares the cumulative nominal return of the anchor asset with the expected cumulative price-level path, and a synthetic ultra-long zero-coupon yield is proposed as the cleanest operational target. The paper further develops a hypothesis of retrograde convergence of expectations: a credible nominal certainty imposed at the far end of the curve may, when supported by a coherent fiscal-monetary regime, progressively organize freely determined shorter yields and exchange rates. The proposal is related to Keynesian liquidity preference, preferred-habitat term-structure theory, Tobin, Wicksell, Fisher, New Keynesian policy rules, Mundell-Fleming-Dornbusch, Cagan, Sargent-

Wallace, the Fiscal Theory of the Price Level, functional finance, and Austrian and financial-repression critiques. The paper does not claim that a terminal interest-rate peg mechanically ends hyperinflation; it derives conditions under which such a peg could operate as a novel long-horizon nominal anchor.

1. Introduction

Modern economies devote an extraordinary share of their institutional architecture to stabilizing the price of money at very short maturities. The central bank announces an official rate, steers the interbank market, and uses expectations about the future path of that rate to influence the entire yield curve. The result is a system in which the authority controls the price of one day or a few weeks with great precision, while the horizons that matter for a power plant, a home, a factory, a concession, a railway network, or a long-gestation technology investment remain exposed to shifts in expectations, term premia, and episodes of risk aversion.

This paper starts from a different priority. For a significant share of productive investment, what matters economically is not knowing exactly what liquidity will cost tomorrow, but having a sufficiently predictable range for the nominal risk-free cost of funds over several decades. The proposal therefore treats the ultra-long sovereign rate as monetary infrastructure: a variable whose stability provides households, firms, and public authorities with intertemporal calculability.

The proposed regime does not seek to stabilize every financial price. In its flexible version it may coexist with conventional short-rate control; in its strong version, by contrast, it explicitly accepts that macroeconomic adjustment will appear in all prices below the terminal horizon. The exchange rate may float freely; short and medium rates may rise sharply under inflation and fall when deflation dominates; the curve may invert; private credit premia may vary. What is not allowed is for a crisis of liquidity, expectations, or duration to destroy the nominal horizon for ultra-long financing.

This architecture does not eliminate economic risk: it redistributes risk across prices and horizons. The central hypothesis is that this redistribution may be socially preferable when the objective is to protect fixed-capital formation and reduce discount-rate uncertainty. The ceiling does not turn the nominal yield into a guaranteed real rate, prevent currency depreciation, fix corporate spreads, or neutralize inflation. Its function is narrower: to guarantee a terminal price of time. The strong version takes this idea to its logical conclusion and allows the necessary volatility to concentrate in earlier maturities and in the spot price of the currency.

The paper first develops the contribution and its precedents; examines the regime through different theoretical frameworks; distinguishes a dual architecture from a pure architecture; formalizes the terminal target, purchases, sterilization, and moving duration frontier; defines the inflation traffic-light rule; studies hyperinflation through a two-dimensional 50-100-year anchor; and analyzes transmission, public debt, stress scenarios, fiscal and institutional constraints, and falsifiable predictions.

2. Central thesis, contribution, and degree of novelty

2.1. The long-term price of time as a public good of calculation

The normative argument can be stated simply: when an investment has an economic life of several decades, a substantial part of its valuation depends on the long-term risk-free rate and the premium added to it. Monetary policy cannot fix the return on every project or eliminate business risk, but it can reduce the volatility of one of the common components of the discount rate.

This stabilization is not equivalent to guaranteeing investment profitability. A firm may still fail, a project may generate less cash than expected, and a credit spread may widen. The objective is more modest: to prevent an abrupt change in the ultra-long sovereign benchmark from turning positive-net-present-value projects into unviable projects overnight for purely financial reasons.

In that sense, the proposal distinguishes productive risk from sovereign duration risk. The former should remain in the market; the latter is treated as partially manageable by the monetary authority. Stability of the 50-year rate is intended to lengthen the calculable horizon without eliminating the discipline imposed by cash flows, private credit, or competition.

2.2. What the proposal is - and is not

- It is an ultra-long Yield Curve Control system: the central bank defends a price/yield at the far end of the curve.
- It is a rule centered on 4%, with an ordinary 3-5% band and a hard 5% ceiling on the 50-year sovereign yield.
- It is a monetization rule contingent on the inflation regime, not an obligation to expand the balance sheet permanently.
- It is compatible with short rates far above 5% during inflationary episodes; the yield curve may invert.
- It allows exchange-rate flotation and accepts that part of the adjustment may occur through the currency.
- It is not a direct cap on mortgages, corporate loans, or WACC: it anchors only the risk-free sovereign component; spreads remain market-determined.
- It is not a guarantee of a real rate: with 6% inflation, a 5% nominal yield implies a negative ex ante real return if expectations match that inflation rate.
- It is not equivalent to financing every public deficit. The design requires a distinction between ceiling-defense purchases, expansionary purchases, and sterilization.

The general proposal contains two compatible specifications: AMUL-D (dual), which combines the ultra-long anchor with a conventional short-rate rule, and AMUL-P (pure), which fixes only the terminal sector of the curve and leaves all shorter maturities without a price target.

Under AMUL-P, “not controlling the short end” does not mean that the central bank abandons the payment system. It must supply reserves and operational liquidity to settle transactions; what it renounces is announcing a target price for that liquidity. The overnight rate may therefore be determined endogenously.

The pure version is the paper’s strongest normative thesis. The dual version is retained as a specification that is easier to integrate into existing monetary frameworks and as an empirical benchmark.

2.3. Precedents and specific contribution

The idea that the central bank can, and under certain circumstances should, act directly on long maturities is not new. Keynes argued that the monetary authority need not restrict itself to short-term instruments and explicitly contemplated operations in debt of different maturities. In practice, the U.S. Federal Reserve maintained a ceiling of roughly 2.5% on long Treasury bonds during the Second World War and the immediate postwar period; the Federal Reserve again deliberately altered the maturity composition of its portfolio through the 2011 Maturity Extension Program; and the Bank of Japan developed a Yield Curve Control system centered on the ten-year bond from 2016 onward.

Accordingly, this paper’s contribution should not be presented as the invention of long-yield targeting. The contribution lies in the specific combination of five elements: (i) selection of the ultra-long end - 50 years or a 30-50-year index - as the primary anchor; (ii) a 4% focal point within a 3-5% band; (iii) an absolutely defended 5% ceiling; (iv) monetization intensity determined by a traffic-light rule for inflation and expectations, with explicit tolerance of 3-5% inflation while it remains controlled; and (v) deliberate acceptance that the short end and the exchange rate absorb a larger share of adjustment.

The architecture therefore reverses the priorities of the standard regime. The short end is not stabilized in the hope that the long end will respond; the long end is stabilized while the short end is allowed to react more freely to the cycle. The novelty that can prudently be defended is architectural rather than elemental.

Version 0.9 incorporates and consolidates two extensions that broaden this architectural novelty. The first is a moving control frontier that, under extreme deflation, retreats from the terminal horizon toward shorter maturities only after the long end has reached its lower bound. The second is an extraordinary regime for very high inflation in which the central bank can simultaneously extend the horizon and widen the ceiling, creating a two-dimensional terminal nominal anchor instead of attempting to stabilize the entire curve immediately.

The deepest conceptual difference therefore does not lie in using bond purchases to alter a yield - a familiar mechanism - but in reversing the temporal direction of stabilization. The conventional framework fixes or guides the present price of money and relies on expectations to transmit that signal toward progressively longer maturities. AMUL-P considers the inverse possibility: fixing only a terminal nominal condition and allowing the preceding price structure to find endogenously the path consistent with it. In compact terms, the regime investigates whether monetary policy can stabilize “from the future toward the present.”

2.4. Central proposition: reversal of the direction of transmission

The difference between AMUL-P and conventional Yield Curve Control is not merely one of maturity. Under the standard regime, the authority administers the present price of money and uses expectations to project that decision into the future. Under AMUL-P, the authority fixes only a terminal condition and leaves earlier monetary prices - short and medium rates, forwards, and FX - to find endogenously the path consistent with it. The distinctive hypothesis is therefore a reversal of the operational direction of transmission: from present→future to terminal future→present.

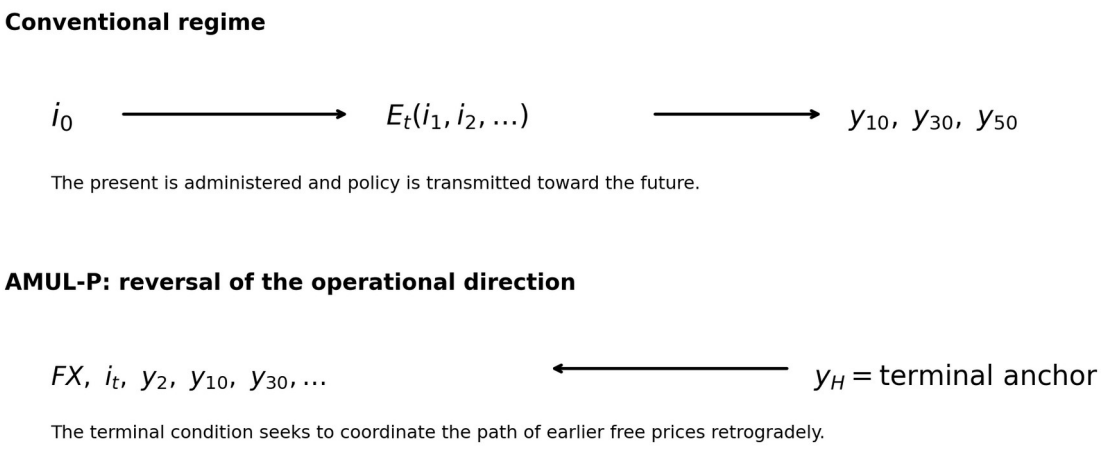

Conventional regime
i_0
$E_t(i_1, i_2, \ldots)$
$y_{10},\ y_{30},\ y_{50}$
The present is administered and policy is transmitted toward the future.
AMUL-P: reversal of the operational direction
$FX,\ i_t,\ y_2,\ y_{10},\ y_{30}, \ldots$
$y_H =$ terminal anchor
The terminal condition seeks to coordinate the path of earlier free prices retrogradely.

Figure 6. Reversal of the operational direction of transmission. The diagram represents a causal hypothesis to be tested, not a mechanical identity.

This formulation must be interpreted precisely. The terminal anchor does not determine every earlier price by identity; it provides a boundary condition. The empirical content of AMUL-P is to test whether, under a compatible fiscal-monetary regime, freely determined prices converge in an orderly way toward a path consistent with that terminal condition.

3. Historical and operational precedents

3.1. Keynes: deliberate control of the maturity structure

The closest theoretical precedent is found in Keynes. In The General Theory, the long-term interest rate appears as a conventional variable, dependent not only on current conditions but also on expectations about future policy. Keynes also observed that authorities tended to operate in short-term debt without any necessary

reason to confine themselves to that segment, and went so far as to propose that the central bank stand ready to buy and sell debt of different maturities at announced prices.

This observation is crucial for positioning the present proposal. Keynes already contains two central intuitions: that the authority can directly influence a complex of rates across maturities and that the credibility of the rule conditions its effectiveness at the long end. The present model adopts those intuitions, but turns them into a specifically ultra-long numerical rule and combines them with an explicit mechanism for inflation adjustment, sterilization, and exchange-rate flotation.

3.2. United States, 1942-1951: the precedent of the long-rate ceiling

In April 1942, the Federal Reserve committed to maintaining a very low Treasury-bill rate and, implicitly, a 2.5% ceiling on long bonds. The main objective was to stabilize the market and reduce the cost of war finance. The experience demonstrates the technical power of a price commitment: an authority capable of creating liabilities can defend a nominal yield on debt denominated in its own currency.

The same episode also shows the institutional risk. To sustain the peg, the Federal Reserve lost control over the volume of assets it had to absorb and over the associated monetary expansion. Tensions with the Treasury and postwar inflation culminated in the 1951 Treasury-Fed Accord. This precedent justifies explicitly separating defense of the ceiling from net monetization in the regime proposed here.

3.3. Operation Twist and the idea of acting on duration without necessarily expanding the balance sheet

In 2011, the Federal Reserve approved a maturity extension program that purchased Treasuries with maturities of six to thirty years and sold an equivalent amount of short-term debt. Its stated purpose was to reduce long-term rates without necessarily increasing the total size of the balance sheet. The episode is conceptually important because it shows that policy directed at the slope and duration of the curve can be separated, at least partially, from net monetary creation.

This logic is the closest operational precedent to the sterilization proposed under the red regime. When defending the 5% ceiling requires purchases, the authority can offset the liquidity effect through sales of short assets, reverse repos, term deposits, or other remunerated liabilities, preserving the desired duration composition without turning every long-term purchase into additional monetary stimulus.

3.4. Japan, 2016-2024: Yield Curve Control and lessons on market functioning

The Bank of Japan introduced QQE with Yield Curve Control in 2016, combining a negative short rate with JGB purchases aimed at keeping the ten-year yield around zero. During certain periods it offered fixed-rate, unlimited-quantity purchases to defend the operating range. This case shows that a credible price promise may reduce the quantity actually required when the market believes in the authority's capacity and willingness to act.

Japan also reveals the costs of prolonged intervention: reduced liquidity in some segments, weaker price discovery, and a growing central-bank presence in the market. In March 2024, the Bank of Japan judged that the YCC framework had fulfilled its role and returned to using the short rate as its main policy instrument, while retaining JGB purchases and the ability to respond to abrupt increases in yields. The present model takes this episode both as evidence of feasibility and as a warning about exit design, market depth, and balance-sheet concentration.

4. Interpretation through different economic theories

4.1. Keynes, liquidity preference, and the convention of the long rate

From a Keynesian perspective, the regime is especially natural. The long rate embeds a convention about what constitutes the normal or sustainable level of future rates. If that convention is fragile, a shift in expectations can raise the required yield even without a proportional change in real fundamentals. An authority that announces a credible purchase price at the 50-year point replaces part of that private convention with a public convention.

The mechanism is consistent with the idea that investment responds to the marginal efficiency of capital relative to financing costs. Stability of the long-term benchmark reduces one source of volatility in that comparison. The classic Keynesian difficulty - that the long rate may prove recalcitrant if the market expects a future reversal - is addressed through the commitment to an absolute ceiling: the central bank promises not a volume of purchases but a limiting price.

4.2. Preferred habitat, segmentation, and the term premium

Modern preferred-habitat theory provides one of the most direct foundations for ultra-long purchases to have real effects on the yield curve. If certain investors - pension funds, insurers, banks, duration managers - prefer specific maturities and arbitrageurs are risk-averse, the net supply of bonds in each segment affects yields. Long rates are not merely the mechanical average of future short rates.

In the Vayanos-Vila framework, central-bank purchases alter the amount of duration risk that the private sector must absorb and can reduce the term premium. This allows 50-year YCC to be effective even if the short rate moves in the opposite direction. Precisely this friction makes the proposed architecture possible: the authority can intervene in the term-premium component at the long end while preserving the short rate as a countercyclical instrument.

4.3. Tobin, asset valuation, and irreversible investment

From Tobin's q and the investment literature, a stable decline in the discount rate raises, ceteris paribus, the value of existing assets relative to replacement cost and can stimulate capital formation. The proposal does not seek to maximize valuations, but to reduce the variance of the long-term risk-free component.

The theory of irreversible investment adds an uncertainty argument. When an investment cannot be reversed without cost, the firm possesses an option to wait. Greater uncertainty raises the value of waiting and increases the threshold required to invest. If the ultra-long anchor reduces uncertainty about discounting, part of that waiting value disappears and marginal projects may be undertaken earlier. This is one of the central channels through which the proposal seeks to favor productive investment.

4.4. Wicksell: the natural-rate objection

The Wicksellian critique is fundamental. If the relevant financial rate is held persistently below the natural rate consistent with equilibrium between saving and investment and with price stability, a cumulative inflationary process emerges. A 5% nominal ceiling cannot be regarded as optimal in every state of the world regardless of productivity, time preference, and expected inflation.

The design responds partially to this objection by allowing the real short rate to rise with inflation, ending expansionary monetization when inflation becomes unanchored, and allowing the currency to absorb shocks. Nevertheless, the hard ceiling deliberately introduces a constraint that may place the real long rate below its equilibrium level. The proposal accepts that cost because it prioritizes nominal stability at the investment horizon, but the Wicksellian analysis correctly identifies the danger condition: the more persistent the gap

between the nominal ceiling and expected inflation, the greater the pressure on prices, FX, or the central-bank balance sheet.

4.5. New Keynesian economics and the Taylor rule: reversal of the instrument hierarchy

In the canonical New Keynesian model, the central bank moves a short-term interest rate according to a reaction rule for inflation and the output gap, while the long rate is determined by expectations of future short rates and term premia. The present architecture does not eliminate short-rate adjustment; it changes its status. The short rate ceases to be the anchor of intertemporal financial stability and becomes the main residual instrument for disciplining inflation.

Under AMUL-D, the regime can coexist with a modified Taylor rule: when inflation exceeds the preferred zone, the policy rate may rise even above the 50-year yield. Under AMUL-P, by contrast, the Taylor rule ceases to be a central-bank price rule and becomes a counterfactual benchmark: the observed short rate may respond endogenously in a similar way, but the authority does not set it. In both versions, yield-curve inversion is not necessarily a design error; it may be one of the deliberate or endogenous adjustment mechanisms.

4.6. Fisher and debt-deflation

The asymmetry of the rule toward low inflation can be justified through Fisher. Deflation raises the real value of nominal debts, weakens balance sheets, and can trigger liquidations that further depress prices and activity. A regime that intensifies monetization when persistent inflation falls below 2% is intended precisely to prevent the combination of debt and deflation from generating a spiral.

For this reason, the system does not treat 1% inflation and 4% inflation as symmetric deviations. Deflation risk receives a more aggressive response. The preference for moderately positive inflation - with 2-3% as the normal zone and 3-5% as a tolerable zone under control - explicitly incorporates an anti-deflation bias.

4.7. Mundell-Fleming and Dornbusch: the exchange rate as a shock absorber

With capital mobility and a floating exchange rate, more expansionary monetary policy tends to affect the currency and external demand. Dornbusch's model adds the possibility of overshooting: financial markets adjust faster than prices and wages, so the currency may initially depreciate by more than is required by its long-run equilibrium.

The present regime accepts that volatility as part of the mechanism, but it should not be interpreted as affecting only speculators. Depreciation changes import costs, balance sheets with foreign-currency debt, and corporate margins. The proposal therefore works better in economies whose debt is predominantly denominated in their own currency, with deep hedging markets and an import dependence that does not generate explosive pass-through.

4.8. Monetarism, fiscal dominance, and Sargent-Wallace

The main monetarist objection is that an unconditional ceiling can subordinate the central bank to fiscal needs. If the Treasury issues debt without a credible fiscal path and the authority is required to absorb it in order to defend the 5% ceiling, the market may anticipate future monetization and inflation. The result would be precisely a migration of risk from the yield to the price level or the currency.

The separation between gross purchases and net monetization is the model's institutional response. In the red regime, the central bank continues to defend the ceiling but sterilizes. Even so, Sargent and Wallace remind us that sterilization does not solve a permanent intertemporal fiscal inconsistency: if debt grows without backing from future surpluses and the central bank issues remunerated liabilities to sterilize, the cost may reappear in the consolidated public-sector balance sheet itself.

4.9. Fiscal Theory of the Price Level

From the perspective of the Fiscal Theory of the Price Level, nominal debt and money are state liabilities whose real value must be compatible with the present value of future fiscal resources. Fixing the yield does not eliminate this constraint. If the nominal value of liabilities grows relative to expected fiscal backing, adjustment may occur through a higher price level.

This interpretation reinforces one conclusion of the paper: the 5% ceiling must be a monetary rule for stabilizing the horizon, not an unlimited fiscal license. A coherent fiscal rule, though not necessarily procyclical, is complementary to the regime.

4.10. Functional finance and Post-Keynesian approaches

From the functional-finance tradition, public debt and money creation are evaluated by their effects on employment, inflation, and real resources rather than by strict analogy with household finance. A monetarily sovereign state can, in principle, set yields on its nominal liabilities if the central bank is willing to act as marginal buyer.

This tradition is compatible with the idea that the regime's ultimate constraint is inflationary and real rather than a technical inability to purchase. The present model, however, is more rule-based than a purely functional formulation: it fixes a specific maturity architecture, a numerical band, and a traffic-light rule that limits monetization when signs of de-anchoring appear.

4.11. Austrian critique: intertemporal signaling and the risk of malinvestment

From an Austrian perspective, the main problem would be that an administered long rate may cease to reflect saving preferences and the productivity of capital, encouraging projects whose duration would not be sustainable at a free-market rate. The ceiling could therefore favor an excessively long capital structure and generate malinvestment.

The design preserves more market signals than full curve control: the short rate, FX, private spreads, and asset prices continue to vary. The objection nevertheless remains. If the central bank systematically holds the 50-year rate below the equilibrium rate, it may distort allocation. This criticism supports maintaining a relatively wide band, a 4% center rather than an extremely low target, and periodic assessment of productivity, saving, and expected inflation.

4.12. Financial repression: a political-economy critique

Interest-rate ceilings on public debt have historically been associated with financial repression, especially when combined with regulation forcing domestic intermediaries to hold sovereign debt, capital controls, or inflation that produces negative real rates. The present regime shares one superficial feature - a nominal ceiling - but does not require capital controls or captive buyers: the buyer of last resort is the central bank.

Even so, if inflation remains persistently above the yield ceiling, private holders earn a negative real return and the policy may operate de facto as a tax on nominal saving. Any normative evaluation must therefore include distribution, saving, pensions, and intergenerational effects, not only investment and fiscal cost.

5. Two regime architectures: dual and pure versions

5.1. The AMUL family

Ultra-Long Monetary Anchoring (AMUL, retaining the original acronym) refers to the family of rules in which the central bank assigns an explicit target to the terminal sector of the sovereign yield curve. The common property is not the absence of other instruments, but the institutional primacy of the ultra-long horizon. The normal regime uses H = 50 years, a 4% focal point, a 3-5% band, and a hard 5% ceiling.

5.2. AMUL-D: dual or flexible version

The dual version retains the orthodox short-term toolkit. The central bank sets or guides a policy rate, may use a Taylor-type reaction rule, and simultaneously controls the terminal yield. This version is closest to historical experiences such as Japanese Yield Curve Control, which combined an explicit short rate with a target for the ten-year bond, and to portfolio-composition operations such as the U.S. 2011 Maturity Extension Program. Its institutional advantage is compatibility with existing frameworks; its conceptual cost is that public intervention is distributed across both ends of the curve.

5.3. AMUL-P: pure, strong, or radical version

The pure version states the paper's strongest thesis: the central bank announces no yield target for $0 < \tau < H$. Under the normal regime $H = 50$. Overnight, one-year, five-year, ten-year, thirty-year, and forty-nine-year rates are market-determined. Only the terminal end - represented by a constant-maturity 50-year yield and, where instruments exist, by the tail $\tau \geq 50$ - is subject to the public corridor. The exchange rate is not stabilized either. The monetary authority preserves the payments infrastructure but renounces the use of the short-term liquidity price as a macroeconomic anchor.

This variant reverses the conventional direction of monetary-policy causality: instead of fixing the present in order to influence the future, it fixes a distant nominal boundary and allows the present to find endogenously the path consistent with it. The thesis is deliberately riskier, but also more falsifiable and conceptually distinct.

The strong terminal-coordination hypothesis can be stated as follows: an authority that controls only the yield at H, and operates within a compatible fiscal-monetary regime, may induce a determinate and stable path of earlier nominal prices without fixing them directly. The substantive content of the hypothesis is not that the administered yield "reveals" expectations - it cannot - but that a credible terminal constraint alters arbitrage, duration, financing, and money-demand decisions in the segments that remain free.

5.4. The exchange rate as "horizon zero": a metaphor for temporal organization

The spot exchange rate is not, technically, a zero-maturity bond. It is nevertheless useful to represent it as the instantaneous price of the monetary unit against other units, goods, or assets. On a conceptual horizon axis, spot FX occupies $\tau = 0$; interest rates describe intertemporal prices for $0 < \tau < H$; and the public anchor appears at $\tau = H$. The metaphor helps visualize the philosophy of AMUL-P: maximum price freedom in the present and maximum institutional certainty at the terminal end.

5.5. Migration of the uncertainty premium and reversal of the temporal gradient

Control of the terminal yield does not make the term premium disappear. The decomposition between expected short rates and the term premium remains valid, but the observed yield at H is administratively constrained. The amount of duration absorbed by the central bank becomes the residual variable preventing both components from being fully reflected in y_H. Uncertainty does not disappear: it migrates toward uncontrolled maturities, private premia, FX, and the central-bank balance sheet.

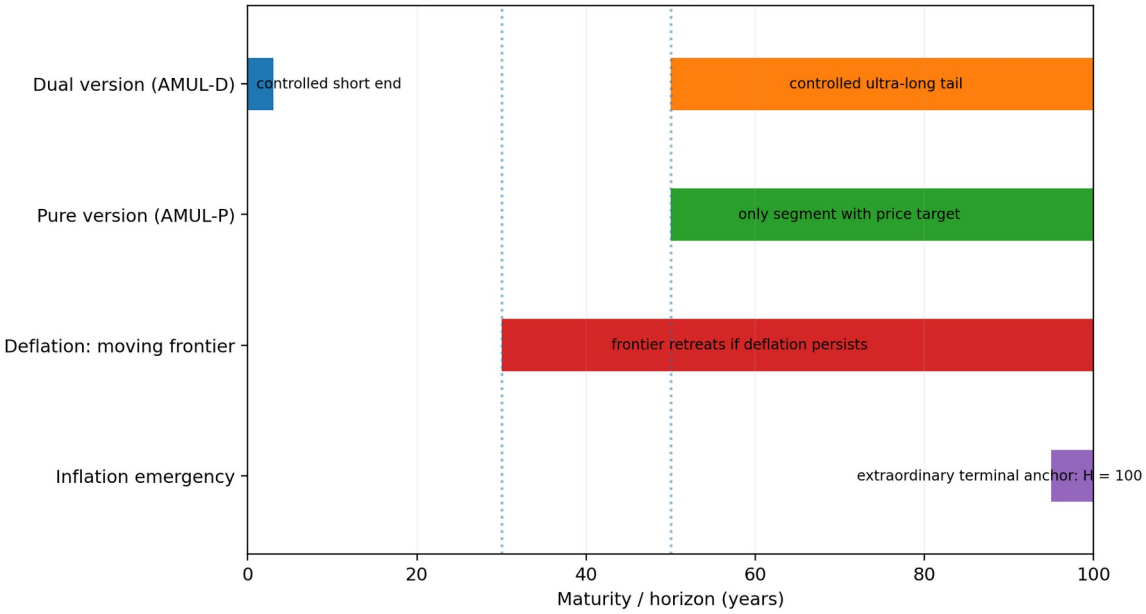
Under the pure version, a partial reversal of the temporal gradient of uncertainty may emerge. Conventional intuition associates longer horizons with greater uncertainty. Under a credible terminal ceiling, a very distant maturity may display less observable nominal volatility than intermediate maturities. The aim is not to eliminate economic risk but to shift where it can be expressed. Arbitrage continuity prevents arbitrary jumps between adjacent maturities, but does not prevent volatility from concentrating in the free part of the curve.

5.6. Implications for public-debt management

The architecture changes Treasury incentives. If the two-year cost is far above the capped fifty-year cost, a rational strategy will tend to lengthen issuance and reduce refinancing risk. If the short end is exceptionally

below the long end, it may be used tactically, but the regime creates a structural bias toward very long-duration debt. This coordination must not become fiscal dominance: the greater the amount issued at the administered price without private demand, the greater the central bank's residual absorption.

Figure 3. Family of maturity-control architectures



Source: author's calculations. The chart represents price-target zones, not the full set of liquidity operations required for the payment system.

6. Stylized formal model

6.1. Decomposition of the ultra-long yield

As a starting point, the nominal 50-year yield can be represented in simplified form as the average of expected short rates plus a term premium:

$$y_{50,t} = (1/50) \cdot \Sigma_{j=0}^{49} E_t[i_{t+j}] + TP_{50,t}$$

The regime does not reject the expectations hypothesis; it adds that $TP_{50,t}$ can be influenced by the net supply of duration and that, under preferred habitat, public purchases alter the yield even without fixing the entire path of short rates. Intervention may also change expectations themselves regarding the persistence of high rates.

6.2. Institutional constraint: band and ceiling

$$3\% \leq y_{50,t} \leq 5\% \qquad \text{with structural focal point } \bar{y} = 4\%$$

$$y_{50,t} > 5\% \Rightarrow B^{cap}_t \text{ increases until } y_{50,t} \leq 5\% \text{ is restored}$$

The second equation is not a quantity rule but a price rule. B^{cap}_t is endogenous: the quantity purchased depends on how much the market wishes to sell at the price consistent with the ceiling.

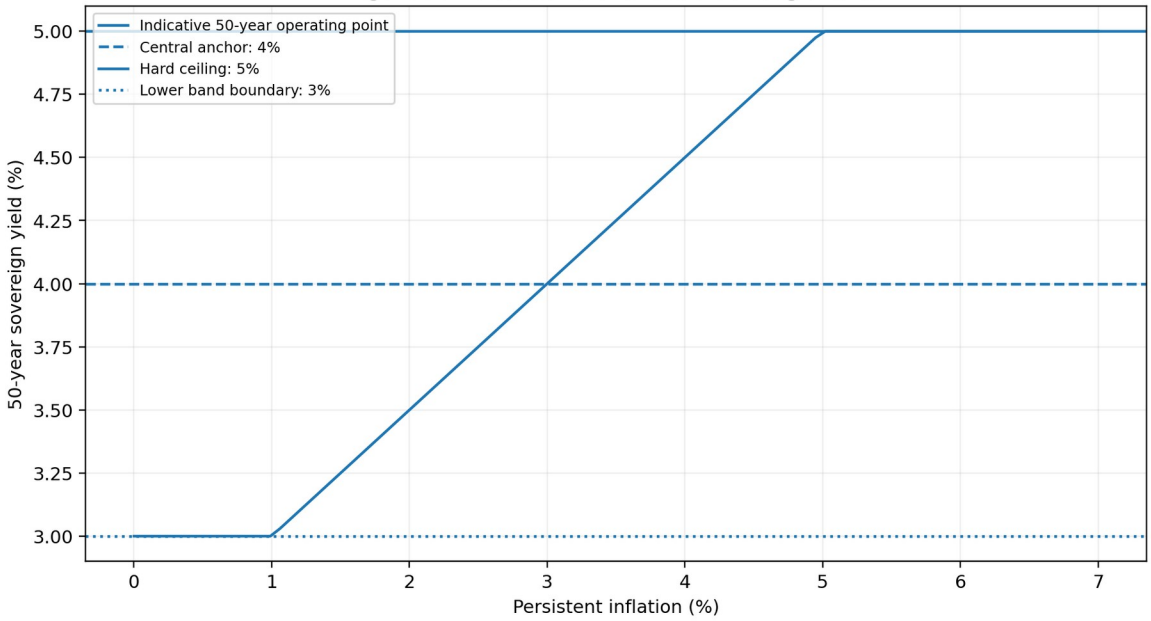
6.3. Operating point within the band

To formalize the idea that the effective center may move within the 3-5% band depending on inflation, a simple illustrative function is proposed. It is not intended as a definitive empirical estimate:

$$\hat{y}_{50,t} = \text{clip}[\, 4\% + 0.5 \cdot (\pi^p_t - 3\%),\ 3\%,\ 5\% \,]$$

With this calibration, persistent 3% inflation coincides with the 4% center; 2% inflation shifts the operating point toward 3.5%; 4% inflation shifts it toward 4.5%; and 5% inflation leads to the upper boundary. Below 1%, the indicative target is constrained by the 3% lower band. The rule expresses a preference for more intensive monetization when inflation is low without abandoning the central 4% anchor.

Figure 1. Indicative rule for the ultra-long anchor



Source: author's calculations. The function is normative and illustrative; it is not a structural estimate.

6.4. Expansionary purchases and net monetization

$$B^{stim}_t = \kappa_\gamma \cdot \max(0, y_{50,t} - \hat{y}_{50,t}) \; + \; \kappa\pi \cdot \max(0, 2\% - \pi^p_t)$$

The first term purchases debt when the 50-year yield lies above the operating point. The second adds an extra response when persistent inflation falls below 2%, turning that boundary into a trigger for strong monetization. An empirical extension could add the output gap, unemployment, or financial stress, but the core model can operate using only inflation, expectations, and the curve.

6.5. Sterilization and the separation between gross purchases and net stimulus

$$N_t = B^{stim}_t + (1 - \sigma_t) \cdot B^{cap}_t$$

N_t represents the net monetary expansion relevant for the liquidity impulse; σ_t is the sterilized share of the purchases required to defend the ceiling. In green, σ_t may be low; in amber it rises with inflation and de-anchoring; in red, σ_t tends toward 1 and B^{stim}_t tends toward zero. Thus, a purchase required to prevent y_{50}>5% need not be equivalent to a net expansion of the liquid balance sheet.

6.6. The short end under the two architectures: dual rule and endogenous formation

$$i_t = r^*_t + \pi^e_t + \varphi\pi(\pi^p_t - \pi^{ref}) + \varphi_x x_t + \varphi_e \Delta e_t$$

The preceding equation should be interpreted only as an AMUL-D rule. In the dual version, the short rate may react to inflation, the output gap, and depreciation, and may rise above the terminal ceiling. Under AMUL-P there is no target i_t: the overnight rate and all remaining rates below H are determined by the demand and supply of liquidity, expectations, and arbitrage. The central bank supplies the settlement asset required for the

payment system but does not promise an ordinary price for it. A persistent short rate far above the long rate would indicate that adjustment is concentrating, by design, in the free part of the curve.

6.7. Exchange rate: flotation without a systematic target

The regime contains no exchange-rate parity. The nominal exchange rate floats and absorbs shocks to policy, productivity, risk, and the terms of trade. Exceptional operations may occur in response to market dysfunction, but there is no second price target incompatible with the ultra-long anchor. Flotation is a valve, not a promise of exchange-rate stability.

6.8. Moving duration-control frontier under extreme deflation

The normal regime begins with a minimum control frontier $\tau^* = H = 50$. If persistent inflation falls below 2%, purchases push the 50-year yield toward the lower part of the band. If y_50 reaches 3% and deflation persists, the model does not require the authority to break through that floor indefinitely. Instead, it may expand the set of controlled maturities by moving backward from the long end.

Let τ^*_t denote the minimum maturity subject to the corridor. Under the normal regime $\tau^*_t = 50$. Under persistent deflationary pressure, $d\tau^*/dt < 0$ and the authority progressively purchases 49-, 48-, and 47-year maturities or, in practice, equivalent liquid buckets. The objective is to flatten the tail of the curve from the back around the lower boundary and expand monetization without destroying the signal of the terminal anchor.

6.9. Two-Dimensional Terminal Anchor and the inflation-emergency regime

Hyperinflation requires a rule different from the ordinary traffic-light system. A Two-Dimensional Terminal Anchor, ATB = (H,C), is introduced, where H is the terminal horizon and C the maximum nominal ceiling. The normal regime can be written as ATB_N = (50,5%). Under an extreme-inflation emergency, the central bank may simultaneously expand both dimensions to an extraordinary regime ATB_E = (100,10%).

The extraordinary band may be conceived as a temporary 5-10% corridor, with the operating target initially near the upper boundary when inflation is extreme and an announced downward path toward the ordinary regime as prices stabilize. Ten percent is not a new steady state: it is an emergency ceiling. Purchases in this regime have a single price objective - defending the terminal anchor - and do not constitute discretionary QE aimed at stimulating demand.

Under emergency AMUL-P, one-, two-, ten-, or fifty-year rates may be extraordinarily high and FX may overshoot. Policy does not promise that initial inflation will be the maximum. Hyperinflation may accelerate if money demand collapses or a fiscal inconsistency persists. The proposition is narrower: a credible terminal nominal certainty may create an observable future state around which free expectations begin to organize.

6.10. Terminal Anchoring Margin (MAT)

To avoid misinterpreting 10% at one hundred years, the relevant comparison must cover the entire cumulative price path. Let $\Pi^e_{0,H}$ denote the expected cumulative inflation factor and $A(H,y)$ the nominal capitalization factor of the terminal asset.

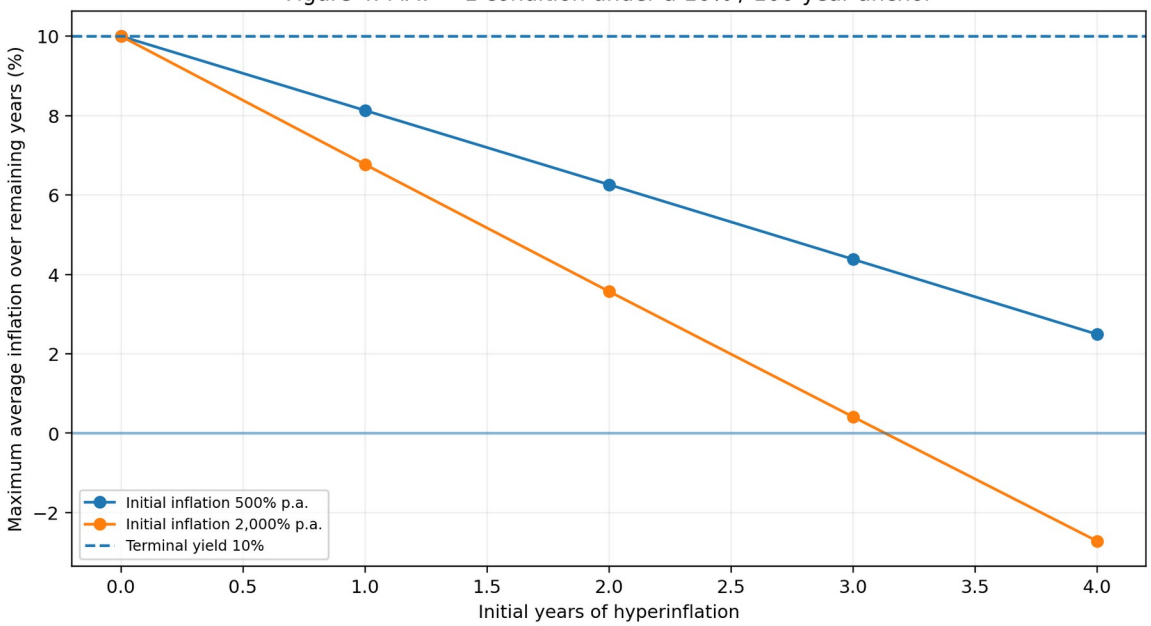
$$\Pi^e_{0,H} = \prod_{t=1}^{H} (1 + \pi^e_t) \qquad ; \qquad A(H,y_H) = (1 + y_H)^H$$

$$MAT_t = A(H,y_H) / \Pi^e_{0,H}$$

MAT > 1 indicates that the cumulative nominal return on the terminal asset exceeds expected cumulative inflation; MAT = 1 defines the cumulative break-even before requiring a positive real return; MAT < 1 implies that the expected price-level path dominates terminal nominal remuneration. A more demanding economic condition incorporates a required real return r_H and default, redenomination, or convertibility risk. MAT is therefore a consistency condition, not sufficient proof of stabilization.

With y_H = 10% and H = 100, A = (1.10)^100 = 13,780.61. Inflation of 500% for a single year multiplies the price level by six and would still be compatible with MAT ≥ 1 if the geometric-average inflation rate over the remaining 99 years were below approximately 8.13%. With a first year at 2,000%, the corresponding later threshold would be approximately 6.77%. Compatibility deteriorates rapidly if hyperinflation lasts for several years, making the speed of stabilization an essential variable.

Figure 4. MAT = 1 condition under a 10% / 100-year anchor



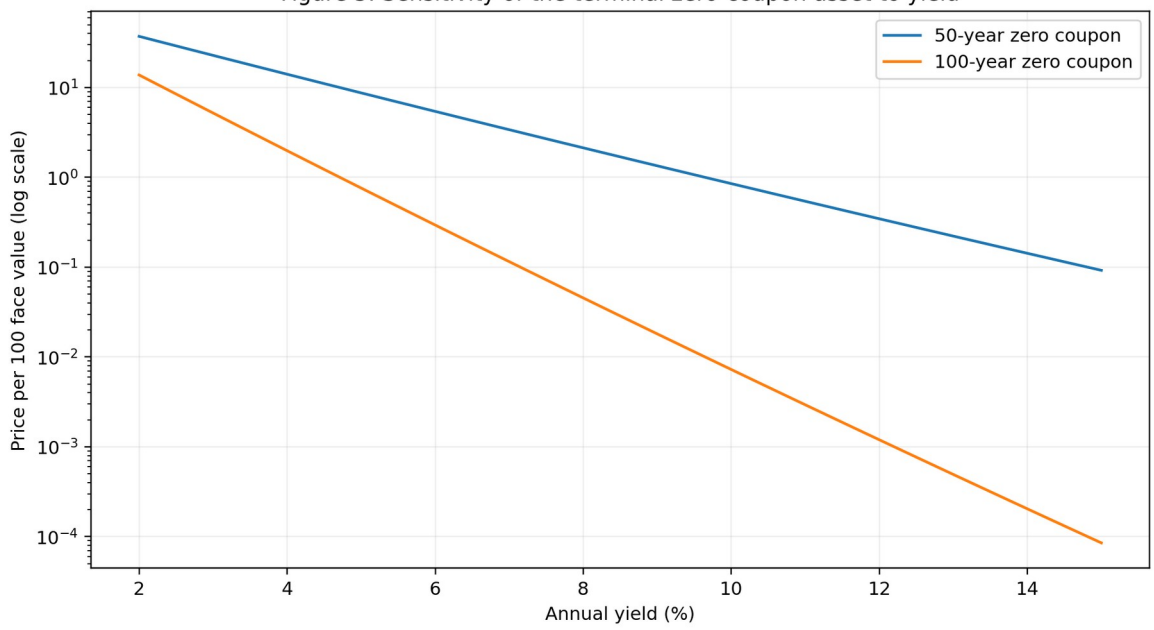
Source: author's calculations. MAT = 1 compares cumulative factors and does not incorporate a real premium, default, redenomination, or political risk.

6.11. The terminal asset: preference for a zero-coupon reference

The expression (1+y)^H corresponds cleanly to a zero-coupon asset or to a strategy that reinvests at the same yield. A conventional high-coupon bond returns a large share of its value well before maturity and has duration far below H. For the model's temporal leverage to be coherent, the preferred operating target is a constant-maturity zero-coupon yield at 50 or 100 years, constructed through STRIPS, swaps, a synthetic sovereign curve, or a dedicated terminal asset.

For a 100-year zero-coupon bond yielding 10%, Macaulay duration is 100 years and modified duration, under annual compounding, is approximately 90.9. Price sensitivity is therefore extraordinary. This high duration does not guarantee macroeconomic transmission, but it makes the terminal end an especially powerful instrument for condensing very-long-horizon expectations.

Figure 5. Sensitivity of the terminal zero-coupon asset to yield



Source: author's calculations. Theoretical zero-coupon bond prices; logarithmic scale. High convexity makes the linear duration approximation unsuitable for large yield changes.

6.12. Retrograde convergence of expectations

Retrograde convergence of expectations denotes the hypothesis that the credibility of an anchor fixed at the temporal endpoint propagates progressively toward the present. In hyperinflation, the central bank need not claim that the market "reveals" low future inflation through the yield that the bank itself controls; such an inference would be circular. The test must be sought in free prices: spot and forward FX, subterminal maturities, deposits, private contracts, the velocity of money, and inflation implied by instruments that are not being controlled.

If, after imposing $y_{100} \leq 10\%$, thirty-, ten-, and five-year yields and depreciation expectations begin to converge toward a path consistent with the anchor without those prices being intervened, that would constitute evidence in favor of the mechanism. If they remain explosive while the central bank absorbs the entire terminal asset, the anchor would be an administrative price without coordinating power. This distinction makes the hypothesis falsifiable.

The non-intervened part of the curve thus serves a double function: it is an adjustment mechanism and, at the same time, an instrument for identifying the regime. The purer the architecture, the cleaner this test becomes: the central bank cannot claim success merely because the price it fixes is stable. Relevant evidence must appear in subterminal maturities, forwards, FX, money demand, and other nominal contracts that are not subject to control.

Emergency proposition
A terminal nominal anchor can be compatible with very high current hyperinflation provided that the expected price-level path converges sufficiently rapidly, the fiscal regime is compatible with that convergence, and there is credibility regarding legal continuity and the absence of default or confiscatory redenomination. The terminal ceiling is a potential coordination condition, not a substitute for those fundamentals.

6.13. Minimum terminal certainty: eliminating at least one dimension of nominal uncertainty

In hyperinflation, the problem is not only the magnitude of observed inflation. The ability to assign reliable nominal references to successive horizons also deteriorates: the currency may lack a relatively stable price tomorrow, one year from now, ten years from now, or even a clear expectation of institutional survival. AMUL-P seeks to eliminate at least one of these dimensions of uncertainty through a known terminal condition: y_H is bounded by a public and verifiable rule.

The immediate contribution of the terminal anchor need not be an instantaneous fall in inflation. Its first function is more basic: to transform a problem in which every nominal horizon may be uncertain into one in which at least one explicit and stable reference exists. In dynamic-problem terms, the market retains freedom over the path but no longer lacks every boundary condition.

Terminal monetary certainty requires a fiscal complement. If budget policy forces explosive and permanent creation of monetary liabilities, the terminal condition lacks economic credibility even if it can be imposed accounting-wise on the targeted bond. With a compatible fiscal anchor, by contrast, the hypothesis is that this terminal certainty may become a coordination point for expectations, free rates, and money demand.

Convergence does not imply that long-run inflation must be numerically equal to the terminal yield. Under the Fisher relation, the equilibrium nominal yield incorporates a real return and, depending on the asset, additional premia. Approximately, $\pi_H^e \approx y_H - r_H - \text{premia}$. Thus, a y_H of 10% could be compatible with expected terminal inflation below 10%; if the ceiling later returns to 5%, the range of compatible inflation may also shift downward.

6.14. Inflation overshooting and a non-monotonic stabilization path

AMUL-P does not require disinflation to begin immediately or to be monotonic. An admissible path could, for example, start from annual inflation of 500%, initially accelerate to 2,000%, and then begin a progressive slowdown. As a purely geometric analogy, this path resembles the asymmetry of Fisher-Tippett extreme-value distributions, especially the Type I or Gumbel case: a relatively abrupt rise to a maximum followed by a much longer declining tail. The analogy does not turn a probability distribution of extremes into a time-series model of inflation; it is used only to describe one possible transition shape. The economic mechanism remains an overshooting of prices, rates, and the currency within a stabilization regime with endogenous expectations and money demand.

The initial peak may arise because adoption of the new regime does not instantly eliminate flight from the currency, repricing of contracts, accumulated depreciation, or expectations formed under the previous regime. Freedom of FX and of the entire curve below H allows this adjustment initially to concentrate in non-administered market prices. The central bank does not attempt to prevent that overshooting through additional controls; its intervention remains confined to the terminal asset and, when inflation is extreme, it sterilizes the liquidity created by defending the ceiling.

The relevant prediction is conditional: if the terminal anchor and the fiscal rule are credible, the acceleration episode should be temporary and the free indicators should subsequently begin to reverse. There is, however, no automatic maximum equal to the initial inflation rate: 500% may become 2,000%, 10,000%, or more if money demand continues to collapse or if the fiscal regime contradicts the anchor. The model allows overshooting; it does not cap it by identity.

Figure 7. Admissible inflation overshooting and subsequent convergence

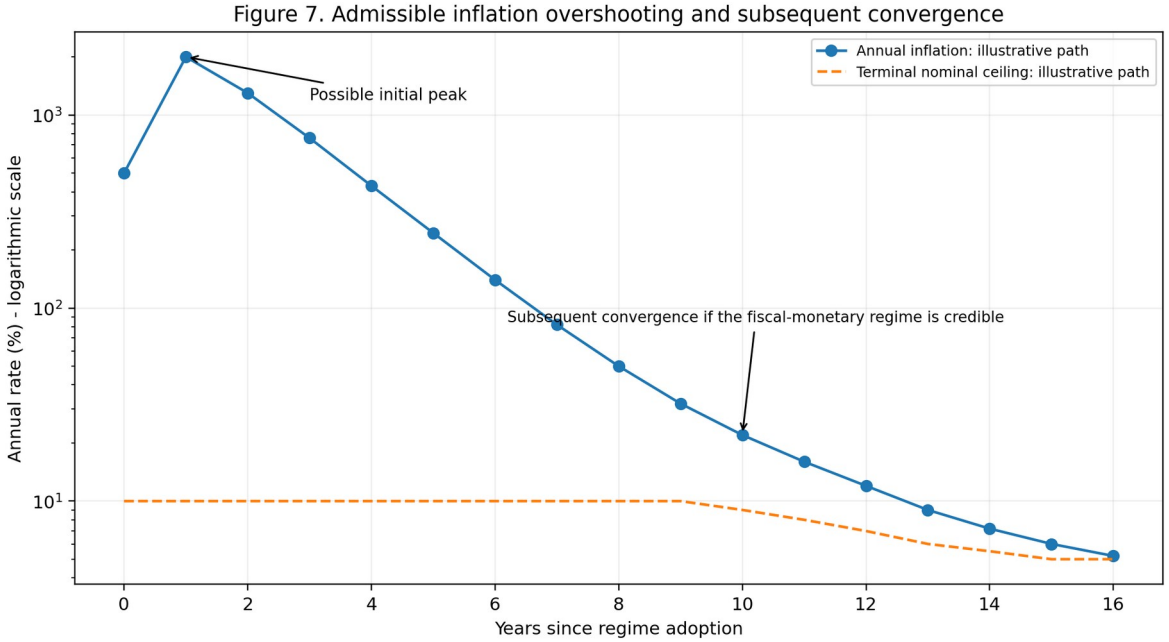


Figure 7. Illustrative hyperinflation path with initial overshooting and subsequent convergence. Inflation need not converge numerically to the terminal yield; it must converge toward a region consistent with that yield, the real rate, and the relevant premia. The curve is illustrative, not a necessary prediction.

Under this interpretation, stabilization can be conceived as a transition function with an endogenous peak followed by convergence toward a region consistent with the terminal anchor. The cumulative MAT condition remains decisive: an initial acceleration can be absorbable within a one-hundred-year horizon if it is sufficiently brief; the longer hyperinflation persists, the lower the subsequent average inflation compatible with the anchor must be.

This extension strengthens the regime's falsifiability. A decline in y_H does not demonstrate stabilization because y_H is administered. The signal must first appear in uncontrolled variables: deceleration of FX, an increase in real money demand, a decline in inflation forwards, and, under the pure version, a progressive fall in freely determined yields from longer toward shorter maturities. That sequence would constitute evidence of retrograde convergence.

6.15. The paradox of terminal stabilizing monetization

The regime permits an apparent paradox: the authority may create money to purchase terminal debt and, at the same time, help reduce inflation expectations. The contradiction disappears once two channels are separated. On the one hand, the purchase increases central-bank assets and, if not sterilized, may increase reserves and liquidity. On the other, the same operation makes credible a terminal nominal condition that did not previously exist, reduces the dispersion of future states considered possible, and may alter expectations about the paths of inflation, interest rates, and the currency.

The final macroeconomic sign depends on which of these channels dominates. In hyperinflation, an additional unit of the monetary base may be of limited relevance against collapsed money demand, whereas creation of a credible terminal reference may have substantial informational and institutional value. If, in addition, the purchases needed to defend the ceiling are sterilized through sales of short assets, remunerated deposits, or other liabilities, the expansionary quantity channel can be reduced without abandoning the anchor.

The paradox can be stated as a credibility-dominance hypothesis: under a compatible fiscal anchor and a terminal rule that the market regards as irrevocable, the disinflationary effect of reducing uncertainty and bounding the set of possible future nominal paths may exceed the direct inflationary effect of the monetization

needed to impose the terminal price. In that case, monetization is not anti-inflationary in itself; it is so only insofar as it purchases an institutional certainty whose contribution to expectations exceeds the net monetary impulse it generates.

This hypothesis is particularly demanding and falsifiable. If, after the purchases, FX continues to accelerate, real money demand keeps falling, and freely determined yields and implied inflation diverge, monetization will be dominating the anchor and the mechanism will have failed. If the opposite occurs while the terminal asset remains administered, the evidence would be consistent with stabilizing monetization through anchoring.

7. Monetization traffic-light rule

The traffic-light rule refers to the normal inflation regime and determines the intensity of net monetization. It must not be confused with the 3-5% band for the 50-year yield. It is compatible with both AMUL-D and AMUL-P: under the dual version the short rate adds a policy reaction; under the pure version it reacts endogenously. Hyperinflation activates a separate extraordinary regime because the objective ceases to be stimulating or restraining demand through net purchases and becomes the construction and defense of a terminal anchor.

Regime	Persistent inflation	Expectations/ dynamics	Net monetization	Defense of the 5% ceiling
GREEN	<3% (strong if <2%)	Anchored; no acceleration	High below 2%; normal between 2-3%	Always
AMBER	3-5%	Controlled; no persistent acceleration or FX spiral	Selective and declining as inflation rises	Always
RED	Clearly >5%, or de-anchoring even if the current reading is lower	Rising expectations, strong acceleration, or FX-inflation feedback	Net stimulus ceases; high/full sterilization	Always, including potentially unlimited purchases

7.1. Green: anti-deflation priority

Below 2%, monetization becomes intensive. The objective is not merely to reduce the 50-year yield to 4%; the operating point may move toward the lower part of the band, around 3-3.5%, with purchases expanding further if inflation continues to weaken.

Between 2% and 3%, monetization may continue at a normal pace. The regime does not treat 2% as an inflation ceiling, but as the boundary below which disinflation risk warrants a particularly strong response.

7.2. Amber: controlled inflation of 3-5%

The amber zone covers the entire 3-5% interval. There is no unclassified area between 4% and 5%. Inflation of 3% may even be compatible with substantial monetization; as it approaches 5%, expansionary purchases should become more selective and sterilization of defensive purchases may increase.

The determining criterion is not the level alone but the dynamics. Stable 4.5% inflation, with expectations not drifting away and no cumulative depreciation, is different from 4% inflation that accelerates quarter after quarter. The traffic-light rule incorporates the level, acceleration, expectations, and FX transmission.

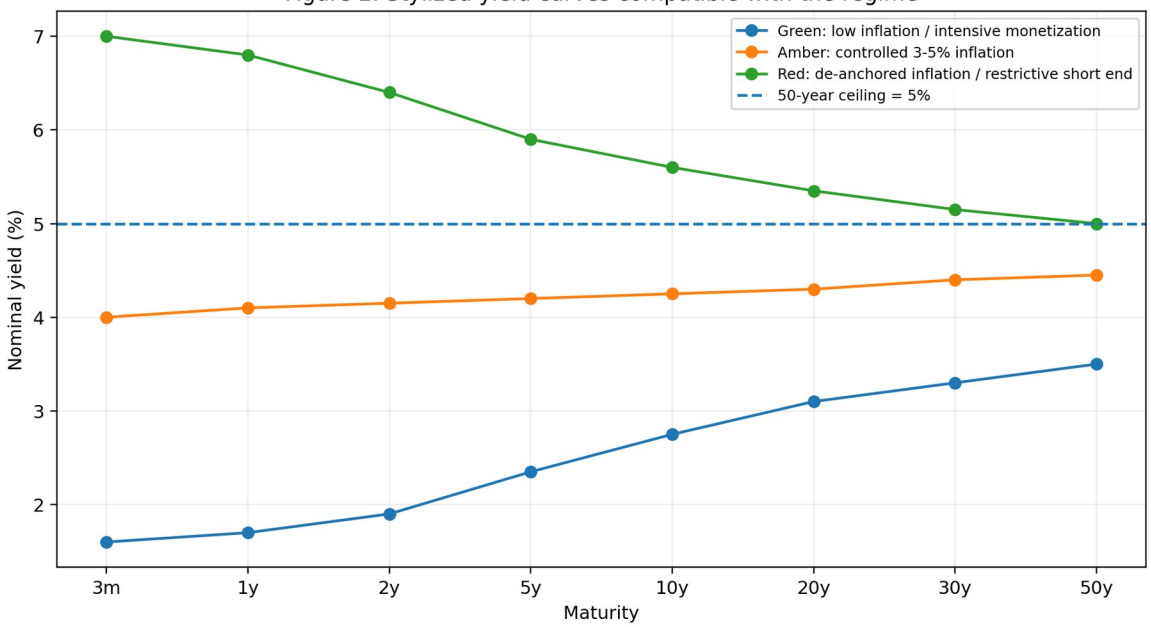
7.3. Red: de-anchoring and strict separation between the ceiling and stimulus

Red applies when inflation is clearly above 5% or when, even before reaching that figure, expectations, acceleration, or exchange-rate dynamics show loss of anchoring. In that state, purchases intended to stimulate the economy cease.

The 5% 50-year ceiling nevertheless remains absolute. If the market requires 6% or 7%, the authority purchases whatever volume is needed to maintain 5%, while sterilizing the liquidity impact as much as

necessary. The short rate may rise sharply. This coexistence - a capped long rate and a restrictive short rate - is one of the model's defining features.

Figure 2. Stylized yield curves compatible with the regime



Source: author's calculations. Curves are purely illustrative; they show that the regime allows yield-curve inversion in the red state.

7.4. Emergency overlay: hyperinflation

When inflation enters an extreme regime - for example, hundreds of percent per year, an accelerating collapse in money demand, or loss of the unit-of-account function - the green/amber/red traffic light becomes insufficient. The emergency ATB is activated. The central bank may temporarily raise C to 10% and H to 100 years, but purchases are made exclusively to defend the terminal price. The liquidity impulse is sterilized through sales of short assets, term deposits, central-bank securities, or other instruments to the extent operationally feasible. Fiscal policy must change regime if the source of hyperinflation is a persistent need for seigniorage.

8. Transmission mechanism

1. Term-premium channel. Ultra-long purchases reduce the amount of duration that the private sector must absorb and put downward pressure on TP_{50}.
2. Expectations channel. A credible ceiling changes the distribution of future yields regarded as possible and may reduce the premium required against extreme scenarios.
3. Discount-rate channel. A stable sovereign benchmark reduces the volatility of the risk-free component used to value long-duration projects and assets.
4. Mortgage and corporate channel. Transmission occurs insofar as mortgages and long-term private debt are priced off the sovereign benchmark; spreads may nevertheless widen and partly offset the benefit.
5. Exchange-rate channel. Greater monetary expansion or a short-rate differential may depreciate the currency, improving external competitiveness but making imports more expensive.
6. Short-rate channel. Under high inflation, the short rate rises and makes working capital, floating-rate credit, and refinancing more expensive, offsetting part of the long-end stimulus.
7. Fiscal channel. The ceiling stabilizes the marginal cost of ultra-long issuance and reduces refinancing risk if the Treasury lengthens maturities, but may create fiscal-dominance risk if used to relax the budget constraint permanently.

8.1. Retrograde-convergence channel under the pure version

Under AMUL-P, the expectations mechanism is observed in the reverse direction from the usual one. The central bank fixes the endpoint and leaves preceding forwards and yields to reveal the speed of convergence the market regards as plausible. This architecture sacrifices direct cyclical control in exchange for more informative market prices across the entire subterminal region.

8.2. Debt-management channel

The Treasury response is part of the transmission mechanism. A terminal ceiling below the short refinancing cost encourages maturity extension. In recession, an increase in long-term fiscal issuance may provide the asset the central bank needs to purchase in order to sustain the control frontier; under inflation, sterilization may operate by selling short maturities or replacing them with remunerated liabilities. Coordination must be transparent so that the regime does not become unlimited fiscal financing.

9. Productive investment, housing, and speculation: scope of the normative thesis

The proposal has an explicit normative preference for the long horizon. A firm building a facility with a thirty-year useful life, a household taking out a fixed-rate mortgage, or a public authority tendering an infrastructure project gains value from a predictable long-term benchmark. By contrast, short-term carry, currency arbitrage, and positions financed at short maturities remain more exposed to changes in the policy rate and FX.

This preference does not justify the literal claim that volatility harms only speculators. A productive importing SME may also suffer from depreciation; a sound firm may depend on short-term working-capital lines; a household may have a floating-rate mortgage. The relevant redistributive effect is temporal and financial: long-duration nominal financing is relatively more protected, while part of the adjustment is shifted toward balance sheets that are sensitive to the short end or the currency.

To strengthen the pro-investment character of the regime, it would be more effective alongside deep markets for fixed-rate mortgages, long-term corporate debt, FX hedging, and working-capital finance that reduces refinancing risk. The monetary architecture creates a benchmark; financial institutions determine how much of that benchmark reaches the real economy.

10. Thirty, fifty, or one hundred years? Choosing the horizon and the anchor asset

The 50-year maturity maximizes the institutional signal: it requires the monetary commitment to span nearly the full life of many productive and residential assets. It also reduces the risk that a rise in ten-year rates will be interpreted as a structural change in the cost of capital over several decades.

Many sovereigns, however, do not have a sufficiently liquid 50-year bond. Targeting a single bond can create scarcity, squeezes, and idiosyncratic distortions. For this reason, the technically preferable variable would be a constant-maturity 50-year yield built from a zero-coupon curve or, alternatively, a 30-50-year duration index. Operations would be executed in a basket of 20-50-year bonds and sovereign swaps, not necessarily in a single benchmark security.

The 30-year sector offers greater liquidity and market depth in several jurisdictions. The choice between 30 and 50 years is therefore a trade-off between horizon and microstructure. The paper retains 50 years as the conceptual benchmark, while allowing the optimal implementation to use a synthetic 30-50-year anchor. What

matters is not a specific ISIN, but preventing the ultra-long sovereign financing cost from escaping the institutional corridor.

The one-hundred-year horizon is not proposed as an ordinary benchmark. Its role is exceptional: when the current nominal structure has lost almost all informational capacity, a very distant horizon enlarges the temporal space for disinflation and increases the duration of the anchor asset. At the same time, it worsens liquidity, modeling, and legal-credibility problems. H = 100 should therefore be understood as an emergency instrument and preferably as a synthetic zero-coupon point, not as an obligation to create a massive market in century coupon bonds.

The horizon choice is thus endogenous to the regime. Under normal conditions, 50 years maximizes the institutional signal without becoming completely detached from observable markets; 30 years may serve as an operational proxy when 50-year liquidity is insufficient; and 100 years is a crisis extension. The rule can be written as $H_t \in \{30 \text{ proxy}, 50 \text{ normal}, 100 \text{ emergency}\}$, with 50 retained as the model's normative reference.

11. Operating scenarios and stress tests

Scenario	Persistent π	y50 before	Traffic light	Net purchases	Short end/FX	Intended outcome
Deflation	0.5-1.5%	4.5%	Strong GREEN	Very high; target ~3-3.5%	Free short rate tends to fall; AMUL-D may cut it; free FX	Prevent debt-deflation and activate investment
Normal zone	2-3%	4.3%	GREEN	Moderate	Free/neutral short rate; AMUL-D may guide it; free FX	Maintain anchor ~4%
Controlled inflation	3-4%	4.7%	AMBER	Selective	Free short rate may rise; AMUL-D tightens; FX absorbs part	Prevent the long end from approaching the ceiling
High amber	4-5%	5.1%	AMBER	Only purchases compatible with preserving anchoring	Potentially high short rate; FX absorbs part	Return to ≤5% and preserve expectations
De-anchoring	>5% or de-anchored expectations	6-7%	RED	Net stimulus = 0; sterilized ceiling defense	Short rate may be extremely high; free FX	Keep 5% ceiling without adding net monetary impulse

11.1. Limiting case: the short rate remains above the ceiling for several years

The most demanding case is persistent inflation requiring the short rate to remain above 5% while the 50-year yield is capped at 5%. Without intervention, the expectations hypothesis would tend to push up the long rate if the market believes the high short rate will persist for a long time. The central bank must then absorb more duration.

There is no risk-free private arbitrage opportunity that automatically forces the two yields to equalize. Financing a 50-year bond at 7% in order to earn 5% creates negative carry and price risk. The marginal buyer becomes an institution - the central bank - that does not maximize profit and can fund itself in its own currency. The counterpart is a larger balance sheet, accounting risk, and possible deterioration in price discovery.

This case shows why the ceiling is technically defensible but not economically free. The longer a restrictive short rate and a capped long rate diverge, the more important sterilization, fiscal policy, and credibility that inflation will return to the controlled zone become.

11.2. Hyperinflation scenario and emergency ATB

Consider current inflation of 500% per year with sharp depreciation. Under AMUL-P the central bank does not attempt to set one-, two-, five-, or ten-year rates or FX. It may shift the terminal anchor from (50,5%) to (100,10%) and purchase only the terminal asset required to prevent its yield from exceeding the ceiling. The rest of the curve may become steeply inverted: yields of hundreds of percent at the short end and 10% at the terminal point. The empirical question is whether free maturities begin to converge toward the endpoint or whether money demand continues to collapse.

The mathematical possibility of MAT ≥ 1 does not demonstrate program sustainability. If 500% inflation lasts three years, prices multiply by 216 and the maximum average inflation over the remaining 97 years consistent with MAT = 1 falls to approximately 4.38%. If it lasts four years, the threshold falls to approximately 2.49%. With 2,000% inflation for three years, the compatible subsequent average is only 0.41%. Extending the horizon to one hundred years buys time, but not unlimited credibility.

Purely cumulative compatibility under ATB = (100,10%)

Initial inflation	Initial duration	Initial price factor	Maximum subsequent average for MAT=1
500%	1	6×	8.13%
500%	2	36×	6.26%
500%	3	216×	4.38%
500%	4	1,296×	2.49%
2.000%	1	21×	6.77%
2.000%	2	441×	3.57%
2.000%	3	9,261×	0.41%
2.000%	4	194,481×	-2.72%

12. Central-bank balance sheet, sterilization, and fiscal coordination

The balance sheet must be analyzed on a consolidated basis. Buying a 50-year bond and issuing remunerated reserves transforms a long-duration public liability into a short-duration public liability. If the rate paid on reserves exceeds the asset yield, the central bank may record accounting losses. For a sovereign-currency issuer, those losses do not imply operational insolvency in the private-sector sense, but they do imply fiscal transfers, distributional effects, and political costs.

Sterilization is not magic either. It neutralizes or reduces the marginal liquidity impulse and allows the price objective to be separated from net stimulus, but it does not eliminate the consolidated public liability. Selling short assets against long purchases may leave the balance sheet approximately unchanged; issuing term deposits, central-bank bills, or remunerated reserves changes the liquidity and duration of liabilities, not their

existence. Under hyperinflation, this distinction is essential: purchases defending the terminal anchor must not automatically become an additional source of seigniorage.

Some minimum coordination with the debt-management office is therefore functionally necessary. If the state wishes to exploit the 50-year anchor, it should issue a sufficient share of long-term debt and avoid dependence on short refinancing that contradicts the objective of intertemporal stability. At the same time, issuance cannot expand without reference to a fiscal sustainability rule, because the ceiling would turn the central bank into an increasingly large residual buyer.

Under the emergency regime, the fiscal condition is even stricter. Historical evidence from hyperinflation stabilizations (Cagan, 1956; Sargent, 1982) and later episodes suggests that a persistent fall in inflation requires eliminating the fiscal source of monetary creation or establishing a credible framework that limits it. The ATB may operate as a visible device for coordinating expectations, but it cannot indefinitely offset a deficit that forces the central bank to expand liquid liabilities at a pace incompatible with money demand.

13. Risks, limitations, and conditions for success

- Fiscal dominance: the ceiling may become automatic financing if there is no credible intertemporal budget constraint.
- Inflation de-anchoring: if the market interprets 5% as subordination at any cost, adjustment may migrate to expected inflation and FX.
- Depreciation and pass-through: highly import-dependent economies may turn the exchange-rate shock absorber into domestic inflation.
- Market depth: prolonged purchases may reduce liquidity, free float, and the quality of price discovery in the 30-50-year segment.
- Balance-sheet risk: high short rates and long assets yielding 5% may generate negative carry for the consolidated central bank.
- Allocation distortion: an excessively low long benchmark may induce projects with excessive duration or asset overvaluation.
- Private spreads: the sovereign ceiling does not guarantee cheap credit if corporate, mortgage, or banking risk rises.
- Distribution: inflation above the yield may hurt nominal savers and creditors while benefiting debtors.
- Exit credibility: changing the ceiling after declaring it absolute would destroy the regime's central property; the parameter should therefore be treated almost like a constitutional rule and revised only through exceptional, ex ante defined procedures.

Informational circularity risk: the controlled yield cannot be used as evidence that expectations are anchored; validation must come from non-intervened prices.

Risk of a nonexistent 100-year market: a century reference may lack depth and require a synthetic zero-coupon curve, swaps, or a specifically designed asset.

Legal redenomination risk: under extreme stabilizations the monetary unit itself may change. The terminal asset requires explicit continuity rules so that monetary reform does not destroy the economic meaning of the commitment.

Indeterminacy risk: the literature on nominal interest-rate pegs shows that a fixed rate without a compatible additional rule may fail to determine the price level on its own. The design requires a complete fiscal-monetary rule and tests of expectations in free markets.

Accordingly, the decisive theoretical test of AMUL-P is not whether a central bank can buy enough bonds to impose y_H - that is mainly an operational question - but whether conditions exist under which the complete system has a nominal equilibrium that exists, is unique, and is locally stable. A future formulation should seek a fiscal rule F such that {AMUL-P, F} determines the price level and generates retrograde convergence; if such

conditions cannot be obtained, the terminal anchor should be interpreted as an interesting institutional hypothesis but one that is insufficient on its own to stabilize the nominal system.

14. Institutional compatibility and the euro-area case

The regime is conceptually simpler in a state with its own currency, debt issued predominantly in that currency, and a central bank able to act without foreign-currency liquidity risk. The United States, Japan, and the United Kingdom are institutionally closer laboratories.

The euro area presents an additional difficulty. Article 123 of the Treaty on the Functioning of the European Union prohibits direct monetary financing of member states, and the ECB architecture requires secondary-market purchases not to become a mechanism equivalent to privileged and unconditional Treasury access to the central bank. An absolute national sovereign ceiling would also be incompatible with multiple issuers and heterogeneous risk premia unless the target asset were redefined.

Any European adaptation would have to use an aggregate benchmark - for example, a synthetic area-wide debt curve or a European safe asset - and would require substantial legal and institutional debate. The proposal is therefore formulated primarily as a regime for full monetary sovereignty and only secondarily as a reference for a possible evolution of the European architecture.

15. Falsifiable predictions and empirical agenda

1. A credible introduction of the ceiling should reduce volatility in the 30-50-year segment and compress the tail premium in the yield distribution.
2. The sensitivity of the 50-year yield to inflation surprises should decline, while the relative sensitivity of the short end and the exchange rate should increase.
3. Higher-duration sectors - infrastructure, utilities, fixed-rate housing, capital-intensive assets - should exhibit a reduction in relative financing costs, controlling for credit spreads.
4. Red-state episodes should display greater curve inversion and an increase in the central-bank balance sheet or sterilization operations.
5. If the fiscal-dominance critique is correct, persistent deficits should be reflected less in y50 and more in expected inflation, FX, or private premia.
6. If preferred-habitat theory dominates, purchases concentrated in the 30-50-year segment should move that segment especially strongly even without equivalent changes in expectations of short rates.
7. If the Austrian malinvestment critique is relevant, prolonged application should increase indicators of capital duration, valuations, or low-return investment before a later correction.

The natural empirical strategy would be to study YCC events, long-duration purchase announcements, and Twist operations using high-frequency event studies, complemented by local VARs or term-structure models with supply factors. The objective would not be to prove that every long purchase is effective, but to estimate the elasticity needed to calibrate κ_y, balance-sheet costs, and the degree to which adjustment is displaced toward FX and the short end.

15.1. Specific predictions of AMUL-P and the emergency regime

Under AMUL-P, volatility of the terminal yield should fall much more than volatility of subterminal rates; the covariance between inflation surprises and y_H should compress.

If retrograde convergence exists, a credible terminal-ceiling announcement should be followed by progressive compression of forwards and freely determined yields from longer toward shorter maturities, without direct purchases in those segments.

Under hyperinflation, success is not measured by y_100 - which is administered - but by declining expected inflation in free instruments, slower FX depreciation, recovery of real money demand, and a reduction in the volume of purchases needed to defend the ceiling.

If the ceiling lacks fiscal credibility, the central bank should end up owning a growing share of the terminal asset while FX and free-market inflation continue to diverge; this pattern would refute the terminal-coordination hypothesis.

15.2. Extreme regimes as identification zones

Extreme inflation or deflation provides, from a scientific standpoint, a particularly informative environment for identifying the model. Under normal conditions, a terminal anchor may generate small movements that are difficult to distinguish from ordinary expectation responses, the business cycle, or other monetary instruments. When the economy is far from nominal equilibrium, the differential predictions of AMUL-P relative to a conventional regime are much larger.

Under severe deflation, the characteristic test is activation of the moving duration frontier: once the terminal yield floor has been reached, purchases should move backward in an orderly way toward shorter maturities and expected inflation should respond before controlling the entire curve becomes necessary. Under extreme inflation, the characteristic test is almost symmetric: only the terminal horizon remains administered, while FX and subterminal maturities initially absorb the tension and, if the anchor works, subsequently begin a retrograde convergence.

The extremes may therefore be regarded as “identification zones” for AMUL-P: they maximize the signal-to-noise ratio of its specific predictions. This does not imply that an authority should cause or prolong a crisis for experimental purposes. The preferable empirical evaluation would use historical episodes, natural experiments, regime changes, unexpected announcements, and counterfactual models; any real-world application during hyperinflation or depression should answer a stabilization need, not an experimental objective.

The falsifiable nature of the framework itself allows failure criteria to be defined in advance. Balance-sheet expansion accompanied by greater divergence in FX, expectations, and free rates would refute the terminal-coordination channel; a progressive decline in those variables without direct intervention would constitute the strongest evidence in favor of the mechanism.

16. Capitalization, duration, and the meaning of terminal ceilings

A 5% yield at 50 years does not mean that the state necessarily pays a cumulative 1,046.7% on principal. The expression (1.05)^50 ≈ 11.47 represents the future value of one unit reinvested annually at 5%, or the capitalization relationship associated with a zero-coupon instrument. A conventional bond pays periodic coupons and returns principal; its cost depends on coupon, issue price, reinvestment, and cash-flow structure.

Capitalization nevertheless provides a useful intuition: small differences in discount rates generate enormous differences in present value when the horizon is very long. That is precisely why the paper gives such importance to stabilizing the far end of the curve. The correct justification for the ceiling is not the existence of a “cumulative margin” of 1,046%, but that limiting variation in the discount rate sharply reduces dispersion in the valuations of long-duration assets.

16.1. Ten percent at one hundred years and its correct interpretation

At 10% per year, (1.10)^100 ≈ 13,780.61. The cumulative return on one unit reinvested would be approximately 1,377,961%. This figure is neither the fiscal cost of an ordinary coupon bond nor a guarantee of purchasing power. It is the nominal capitalization factor of a strategy reinvesting at 10% or of a zero-coupon asset whose price-to-final-payment relationship reflects that yield.

The usefulness of the figure lies in comparing cumulative paths. Current inflation of 500% can coexist with a 10% terminal asset if the market expects sufficiently rapid disinflation; it cannot coexist indefinitely with 500% inflation for decades. The long horizon expands the space for adjustment, but the integral - or, in discrete time, the geometric product - of inflation still imposes the real constraint.

17. Conclusion

The ultra-long monetary anchoring regime proposes reorganizing monetary policy around a temporal principle: the variable deserving the greatest institutional protection may not be the immediate price of money, but the nominal price of time at the horizon relevant for investment and long-duration contracts. Under the ordinary regime, the 50-year benchmark is centered on 4%, fluctuates between 3% and 5%, and may not exceed 5%.

Version 0.9 distinguishes two implementations. AMUL-D adds this anchor to conventional short-rate control. AMUL-P, the strong thesis, abandons price targets at all maturities below H and allows the short end, medium maturities, and FX to absorb adjustment. The term premium does not disappear: part of uncertainty migrates away from the administered maturity and the central-bank balance sheet absorbs the duration required to defend it.

The anti-deflation asymmetry remains. Below 2%, monetization intensifies; between 2% and 3% it may continue normally; between 3% and 5% it is modulated. If the 50-year yield reaches 3% and deflation persists, the minimum control frontier may progressively retreat toward shorter maturities, expanding from the back the segment of the curve subject to the floor. This moving frontier turns the maturity structure of purchases itself into an automatic stabilizer.

For hyperinflations, a second architecture is introduced: the Two-Dimensional Terminal Anchor ATB = (H,C). The central bank may temporarily extend H to 100 years and C to 10%, using purchases exclusively to defend the terminal price and sterilizing their liquidity effect to the extent possible. The Terminal Anchoring Margin compares nominal capitalization of the asset with expected cumulative inflation and shows that extraordinarily high initial inflation may be mathematically compatible with a long-term anchor if rapid convergence is expected. This compatibility is neither causality nor a guarantee.

The central hypothesis of the inflation extension is retrograde convergence of expectations: a nominal certainty established in the distant future may help progressively organize earlier free prices. The mechanism can be considered successful only if non-intervened maturities, FX, and money demand converge on their own. If the central bank ends up absorbing the entire terminal asset while those prices remain explosive, the ceiling is merely administrative.

In situations of extreme loss of nominal reference, the hypothesis can be stated even more simply: AMUL-P does not promise certainty over the entire path, but seeks to guarantee that at least one explicit monetary certainty exists. Combining that terminal condition with a credible fiscal anchor turns stabilization into a problem of convergence toward a known boundary rather than a problem with no reliable temporal reference at all.

The proposal has partial precedents but no direct equivalent: Keynes anticipated deliberate intervention across maturities; the United States demonstrated both the feasibility and fiscal risk of long-rate pegs; Operation Twist showed that duration can be altered without equivalent net balance-sheet expansion; Japan demonstrated both the power and costs of YCC; preferred-habitat theory explains how localized purchases affect term premia; and Cagan, Sargent, FTPL, and the price-level-determinacy literature define the limits of any inflation-stabilization attempt based solely on a nominal interest rate.

The defensible contribution is therefore architectural: a regime in which the state fixes a terminal horizon and, under the strong version, deliberately leaves all earlier prices free; a moving-frontier rule that responds to deflation by moving backward from the long end; and a two-dimensional terminal anchor that simultaneously

extends yield and duration during extreme inflation crises. Future research should estimate the elasticity of the long end to purchases, the migration of volatility toward the free curve and FX, the consolidated cost of sterilization, and especially whether there is empirical evidence of retrograde convergence after credible terminal-price announcements.

The research question summarizing the program is therefore broader than Yield Curve Control: must the price of money be anchored starting from the present, or can an authority fix only a remote nominal state and allow the market to determine freely the entire path leading to it? The answer defines the theoretical scope of AMUL-P.

The model also contains a testable paradox: under certain conditions, monetization used exclusively to impose terminal certainty may reduce rather than increase inflation expectations if the credibility channel dominates the quantity channel and a consistent fiscal anchor exists. Precisely because of its nonlinear nature, the best opportunities for empirical identification arise at the extremes - deep deflation or very high inflation - where the predicted direction of free prices and of the intervention frontier differs most clearly from conventional monetary policy.

Appendix A. Summary operating rule: normal regime, pure version, and emergency

$$\text{Central anchor: } \bar{y}_{50} = 4\% \quad \cdot \quad \text{Band: } 3\%\text{-}5\% \quad \cdot \quad \text{Ceiling: } y_{50} \leq 5\%$$

$$\hat{y}_{50} = \text{clip}[4\% + 0.5(\pi^{p} - 3\%),\ 3\%,\ 5\%]$$

$$B^{stim} = \kappa_{\gamma} \max(0,\ y_{50} - \hat{y}_{50}) + \kappa\pi \max(0,\ 2\% - \pi^{p})$$

$$N = B^{stim} + (1 - \sigma)B^{cap}$$

- Green (<3%): monetization permitted; strong when π^{p}<2%.
- Amber (3-5%): selective and declining monetization; monitor expectations, acceleration, and FX.
- Red (clearly >5% or de-anchoring): net stimulus halted; $\sigma \to 1$; the 5% ceiling remains defended.
- Short rates: free of a predetermined band; they react to the cycle and may exceed 5%.
- FX: floating; no systematic parity target.
- Private market: credit spreads and business risk remain free.

AMUL-D: y_H controlled + conventional target i_t. AMUL-P: y_H controlled, with no price target for $0 < \tau < H$. Under both: floating FX.

Extreme deflation: if y_50 = 3% and π remains below target, τ^*_t retreats: 50 → 49 → 48 → ... or through equivalent liquid maturity buckets.

Inflation emergency: ATB = (H,C), with a potential transition from (50,5%) to (100,10%) and an announced return toward the ordinary regime.

MAT = (1 + y_H)^H / Π(1 + π^{e}_t). The criterion must be extended to incorporate the required real return and default, redenomination, and convertibility risks.

Appendix B. Comparison with related frameworks

Framework	Primary anchor	Maturity	Hard ceiling	Inflation	FX/short-end adjustment
Conventional inflation targeting	Short rate + expectations	Overnight / short	No	Point or symmetric target	Endogenous long end
Fed 1942-51	Administered curve	Short + long	Yes, ~2.5% long	Subordinated to war finance	Limited flexibility

Framework	Primary anchor	Maturity	Hard ceiling	Inflation	FX/short-end adjustment
Operation Twist	Portfolio composition	6-30 years	No	Conditioned by mandate	Balance sheet approximately constant
BoJ YCC 2016-24	Short rate and 10-year	10 years	Variable operating band/ceiling	2% target	FX not a formal target
AMUL-D (dual)	Short rate + 50y terminal	Short and ultra-long	Yes, 5% terminal	Traffic light <3 / 3-5 / de-anchoring	Short controlled; free FX
AMUL-P (pure)	Terminal only	50y normal	Yes, 5% terminal	Same traffic light; endogenous short end	Free short, medium, and FX
Emergency ATB	Two-dimensional terminal anchor	Up to 100y	Up to 10%	Hyperinflation; no discretionary QE	Entire subterminal curve and FX free

Appendix C. Calculations for the 100-year / 10% extension

The nominal capitalization factor is (1.10)^100 = 13,780.6123. The theoretical price of a zero-coupon bond paying 100 in one hundred years at a 10% yield, under annual compounding, is approximately 0.00726 per 100 of face value. This observation illustrates the extraordinary convexity and temporal distance of the instrument, but also its microstructural fragility.

For an initial hyperinflation rate π_0 lasting k years, the maximum geometric-average inflation g over the remaining H-k years consistent with MAT = 1 satisfies:

$$(1 + \pi_0)^k \cdot (1 + g)^{(H-k)} = (1 + y\_H)^H$$

The numerical examples should be interpreted as cumulative constraints, not forecasts. They do not model money demand, seigniorage, price formation, default risk, monetary reform, or fiscal feedback. Their purpose is to show why an enormous initial shock can be compatible with a moderate terminal horizon only when the shock is sufficiently brief and subsequent convergence sufficiently strong.

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